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THE IMPACT OF REPLACEMENT OF MAIZE WITH GRADED CASSAVA ROOT MEAL ON HEMATOLOGY AND GROWTH PERFORMANCE OF STARTER BROILER.

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ABSTRACT
Sixty day-old chicks with an average initial body weight of 136.51 ± O.64 were fed for 28 days with feed compound by grading replacement of maize with cassava root meal (CRM) as the major source of energy at various percentages. They were randomly assigned to four treatments of T_1 (control, 60% maize without CRM) , T_2 (48% maize and 12% CRM), T_3 (36% maize and 24% CRM) and T_4 (24% maize and 36% CRM) in a completely randomized design. Each of the treatments was replicated thrice with five chicks per replicate. Data on the daily feed intake, weekly weight gain and end of experiment's occult blood analysis were got. All the data were subjected to analysis of variance and where difference in means was detected, it was separated using Duncan's New Multiple Range Test. The results showed a significant difference ($P < 0.05$) in the weekly body weight gain when T_4 was compared with T_1, T_2 and T_3 but no significant difference ($P > 0.05$) among T_1, T_2 and T_3 chicks. There was no significant difference ($P > 0.0\ 5$) in the daily feed intake among all the treatments although with gradual numerical increases as CRM progressively increased in quantity. In the same vein, there was no significant difference ($P > 0.0\ 5$) among the treatments in respect of haemoglobin concentration, PCV, RBC and WBC counts although the Hgb, PCV and RBC showed a progressive decline numerically as the CRM increased in quantity. Therefore, 24% CRM can be included in the diet of chicks without a marked detrimental effect in the growth and haematology.

KEYWORDS: Cassava root meal, chicks, weight gain, haematology.

INTRODUCTION

Maize is the major source of energy in poultry feeds and constitutes about 60% of broiler ration. It constitutes between 40- 60% of the feed of manogastric animals (Ayenor, 1985 and Ogbonna, 1991). Maize also serves as a staple food stuff for a good proportion of Nigerians. The ever growing demand of maize for human consumption, livestock feed and some industrial use has pushed its market price to an alarming height (Odukwe, 1994). Energy and protein feedstuffs have been the major hindrances to effective poultry production in Nigeria. This is mainly because of the high cost of these feedstuffs (Anyaegbu, 2001). Feed alone accounts for about 70% of the total cost of production of livestock (Ensminger *et al.*, 1990). Church *et al.*, (1984), Fanimo (1991), Fashina (1991), and Adesehinwa (1997) have demonstrated that the ingestion of numerous dietary components has measurable effects on blood constituents. Cassava root meal (CRM) is basically an energy source its greatest advantage being the high caloric value yield per unit area (Igwebuike and Okonkwo, 1993). Cassava root meal is low in crude protein (about 4%), also contains toxic substance- linamarin which produces hydrogen cyanide when acted upon by linamarase (Mc-Donald *et al.*, 1988). However, indigenous methods of removing the cyanogenic glycoside in cassava root like grating and squeezing, fermentation and exposure to sun for a few days and drying and soaking (Cooke and Maduagwu, 1985, and Tewe and Iyayi, 1989). This situation therefore calls for investigation into locally available alternative source of energy like cassava root meal for commercial poultry enterprise to investigate its effect on growth and haematology of starter broiler.

MATERIALS AND METHODS

EXPERIMENTAL SITE AND MATERIALS

The experiment was carried out at the poultry unit of the Department of Animal Science, Ebonyi State University, Abakaliki. A total of 60 day-old boiler chicks with average initial body weight of 136.51 ± 0.64 procured from Aroma Farms, Owerri, Imo State, Nigeria were used. Cassava tubers were bought, cooked, cut into slices, sun dried and ground to make a cassava root meal (CRM).

EXPERIMENTAL DIET, DESIGN AND MANAGEMENT

The experimental diets are as presented below:

T_1 = 60% maize without CRM
T_2 = 48% Maize and 12% CRM
T_3 = 36% Maize and 24% CRM
T_4= 24% maize and 36 CRM

T_1 served as the control.

Table1: Composition of the Experimental diets for broiler starter.

Ingredient	T_1	T_2	T_3	T_4
Maize	60	48	36	24
CRM	-	12	24	36
SBM	24	24	24	24
PKC	2.00	2.00	2.00	2.00
Wheat offal	3.00	3.00	3.00	3.00
Fish meal	4.00	4.00	4.00	4.00
Blood meal	3.00	3.00	3.00	3.00
Oyster shell	1.00	1.00	1.00	1.00
Lysine	0.25	0.25	0.25	0.25
Meltionine	0.25	0.25	0.25	0.25
Bone meal	2.00	2.00	2.00	2.00
Premix	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25
Total (%)	100	100	100	100
C.P	21.59	20.57	19.67	18.37
ME (Kcal/Kg)	2987.14	2923.60	2916.70	2888.62

Key

CRM	-	Cassava Root Meal
SBM	-	Soybean meal
PKC	-	Palm kernel cake
C.P	-	Crude Protein
ME	-	Metabolisable energy

The chicks were randomly assigned to the four treatments in a completely randomized design. Each treatment was replicated three times with five chicks per replicate. Before the arrival of the chicks, the poultry house was cleaned, swept and disinfected using cresol and diazintol. It was left for 2 weeks after which the open sides were covered with black polythene sheets in readiness for brooding. At the arrival of the day-old–chicks, solution of glucose and vitalyte was given to serve as anti-stress. Then, period of one week acclimatization was given during which commercial broiler starter feed was served. The experimental diets commenced as from the second week. The birds were fed known quantity of feed early in the morning (7am) and in the evening (5pm) during which left over was collected and weighed to get the actual feed consumed daily. Also, water was served *ad-libitum*. Weekly weight gain was got by subtracting the past week's weight from the present. All routine vaccinations and medications were observed. Heat source was got from electric bulbs and kerosene stoves.

DATA COLLECTION AND ANALYSIS

The feed intake and weight gain were obtained using weigh back mechanism. In the same vein, blood was collected through the wing vein for haematological analysis using Wintrobes microhaematocrit improved Neubauer haemacytometer (Schalm *et al.*, 1975). All the results were subjected to analysis of variance and where there was difference in means it was separated using Duncan's New Multiple Range Test. The feed conversion ratio (FCR) was obtained thus:

$$FCR = \frac{\text{Average total feed intake}}{\text{Average body weight gain}}$$

RESULTS AND DISCUSSION

GROWTH PERFORMANCE OF STARTER BROILERS ON GRADED CASSAVA ROOT MEALS (CRM)

Table 2.0 shows the average performance of starter broiler on T_1 (60% maize, no CRM) T_2 (48% maize, 12% CRM), T_3 (36% maize, 24% CRM(and T_4 (24% maize and 36% CRM) as their major sources of metabolizable energy. There was a significant difference ($P < 0.05$) in the average weekly body weight gain when T_4 (227.08g) was compared to T_1 (264.88g), T_2 (250.67g) and T_3 (241.01g) but no significant difference ($P>.05$) when T_1, T_2 and T_3 were compared although numerical differences existed which showed gradual reduction as the quantity of cassava root meal increased progressively. This is in tandem with the work of Eruvbetine *et al.* (2003) that got a progressive decline in the average body weight gain of birds with increasing concentration of cassava root meal. This trend could be attributed to the gradually lowered crude protein in the diets as CRM increased in quantity. This conforms with the work of Sewar and Paquet (1989) who found that the apparent digestibility of crude protein varied with the concentration of protein in the diet. It is also in agreement with the findings of Igene and Esobhawam (2003) and Oboh *et al.* (2004) that an increase in dietary energy increased the weight gain of birds. For the fact that there was no significant difference ($P > 0.05$) in weekly body weight gain among T_2 and T_3 suggests that cassava root meal can replace maize up to 24% without any detrimental effect in chicks. This lightly contradicts the earlier report by Eruvbetine (1992) that the inclusion of CRM up to 30 – 40% in diet of starter broiler had no detrimental effects on body weight. The earlier reports of Job (1975) and Tewe (1987) that dietary protein and not cyanide of cassava peal was the major factor of concern in feed intake and growth could probably be the reason for increase in weight gain as the level of CRM decreased since it has less crude protein.

In terms of the average feed intake, there was no significant difference ($P > 0.05$) although the quantity of feed consumed increased gradually as the CRM increased. This is likely because of the lower energy in the feed as CRM increased progressively (Chwalibog, 1991). Studies have also shown that birds eat in order to satisfy their energy needs thus in a situation of lower dietary energy, feed intake will be higher (Hill and Danskey, 1954, Sahlotaut, 1987, Blaxter, 1989 and Coop and Kyriazakis, 2001). It is also most probable that due to corresponding low crude protein content of the feed as CRM inclusion increased, the feed intake increased.

HAEMTOLOGICAL PARAMETERS OF STARTER BROILER FED GRADED CASSAVA ROOT MEAL.

Table 3.0 shows that there was no significant difference ($P>0.05$) in haemoglobin (Hgb) concentration, packed cell volume (PCV), red blood corpuscles (RBC) and white blood corpuscles (WBC) when all the treatments were compared. However, in the Hgb, PCV and RBC, there were numerical decreases as the quantity of CRM increased progressively while there was no pattern of variation in respect of the WBC irrespective of CRM inclusion. Nevertheless, the Hgb concentration showed T_1 (12g/dl), T_2 (10.20g/dl), T_3 (9.10g/dl) and T_4 (8.21g/dl) while PCV was T_1 (26%), T_2 (24%), T_3 (24%) and T_4 (22%). The RBC count showed T_1 (11.20 x $10^6/\mu\ell$), T_2 (9.70 x $10^6/\mu\ell$), T_3(10.12 x $10^6/\mu\ell$) and T_4(8.60 x $10^6/\mu\ell$) as against WBC counts that were T_1(23.30 x $10^3/\mu\ell$), T_2(23.50 x $10^3/\mu\ell$), T_3(29.60 x $10^3/\mu\ell$) and T_4(26.30 x $10^3/\mu\ell$). All these parameters for chick fell within normal physiological range as established by Mitruka and Rawnsley, (1977) and Ross *et al*. (1978). The steady decrease in blood parameter could be due to anti-nutritional factor (hydrogen cyanide) associated with CRM. This is in tandem with the work of Oke (1969) who postulated that hydrogen cyanide has high affinity for metal ions such as copper and iron which could have prevented the absorption of these important erythropoietic metals. This also agrees with Brown and Clime. (1972) who observed decreasing haematological parameters associated with low protein quality and increased HCN in diet.

Table 2.0:- Performance Characteristics Of Starter Broilers Fed Graded Cassava Root Meal

Parameters	T_1	T_2	T_3	T_4	SEM
Av. initial body weight (g)	136.33	136.18	137.11	136.41	0.41
Av. daily feed intake (g)	110.36	114.13	118.36	118.92	4.18
Av. total feed intake (g)	3090.08^b	3195.64^b	$3314,08^b$	3329.76^a	56.09
Av. daily body weight (g)	37.84^a	35.81^a	34.43^b	32.44^b	2.33
Av. weekly body weight gain(g)	264.88^a	250.67^a	241.01^a	227.08^b	7.96
Av. final body weight gain (g)	1059.52^a	1002.68^a	964.04^a	908.32^b	31.86
Av. final body weight (g)	1195.85	1138.86	1101.15	1044.73	31.75
Feed conversion ratio	2.92	3.12	3.44	3.67	0.33

a,bc:- Rows with different superscripts are statistically different ($P<0.05$)

Table 3.0:- Haematological Parameters Of Starter Broiler On Graded Cassava Root Meal.

	T^1	T_2	T_3	T_4	SEM
Hgb (g/dl)	12.000	10.20	9.10	8. 21	1.35
PCV (%)	26.00	24.00	24.00	22.00	1.63
RBC (x $10^6/\mu\ell$)	11.20	9.70	10.12	8.60	1.08
WBC (X $10^3/\mu\ell$)	23.30	23.50	29.60	26.30	1.49

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